**PATENT APPLICATION**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Takamitsu KAWAI

Group Art Unit: 3651

Application No.: 10/806,174

Examiner: L. NICHOLSON III

Filed: March 23, 2004

Docket No.: 119212

For: FEEDING DEVICE FOR FEEDING RECORDING MEDIUM

## APPLICANT'S SEPARATE RECORD OF TELEPHONE INTERVIEW

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Further to the May 4, 2007 telephone interview with Examiner Nicholson, Applicant provides this Separate Record of the Telephone Interview.

During the telephone interview, Applicant's representative discussed the rejection of claims 1, 3, 6, 10, 11, 20 and 21 under 35 U.S.C. §103(a) over JP-A-9-86749 (JP'749) in view of JP-A-57-072538 (JP'538).

As discussed during the telephone interview, Applicant clarified that JP'538 does in fact disclose that the guide plate 5 can be arranged to be in contact with the drive roller 1 (see paragraph [0013] of the enclosed translation). Applicant's thus clarifies and corrects the remarks made in the April 20, 2007 Request for Reconsideration because JP'538 does state that the guide plate 5 can be in contact with the drive roller 1.

However, as discussed in the telephone interview, JP'749 and JP'538 fail to disclose or suggest an overlap-amount limiter that can be held in contact at a surface thereof with a radially outer end portion of a driven roller, as recited in claims 1 and 10.

As admitted, JP'749 fails to disclose the overlap-amount limiter of claims 1 and 10.

As agreed during the May 4, 2007 telephone interview, JP'538 only discloses a guide plate 5 being in contact with the roller 1, which is a drive roller 1. As a result, JP'538 also fails to disclose an overlap-amount limiter that can be held in contact at a surface thereof with a radially outer end portion of a driven roller.

As agreed, because the combination of JP'749 and JP'538 fails to disclose all of the features recited in claims 1 and 10, the application should, and has been placed in condition for allowance.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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JAO:SMS/lmf

Attachment:
Translation of JP'538

Date: May 21, 2007

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**Translation of Kabashima (JP-S57-72538A)**

**Specification**

1. Title of the Invention

Sheet supplying device

2. Claim

A sheet supplying device comprising a feed roller 1 and a multifeed preventing roller 2 which have radial protrusions and recesses (i.e., have grooved outer circumferential surfaces) so as to utilize rigidity of a paper sheet, said sheet supplying device being characterized in that there is provided a guide member that is configured to extend up to a nipping region defined between the rollers 1, 2 with the guide member being not in contact with either one of the rollers 1, 2.

3. Detailed Description of the Invention

[0001] The present invention relates to a sheet supplying device for supplying stacked paper sheets one by one in a copier, printer or the like.

[0002] Fig. 1 is a view showing a conventional sheet supplying device. In the conventional device, paper sheets 7 are stacked on a sheet supply tray 4, and receive a suitable amount of pressure which is applied by a sheet pressing member 6 and which forces the paper sheets 7 against an auxiliary feed roller 3. With rotations of the auxiliary feed roller 3 and the feed roller 1, a lowermost one of the stacked sheets is fed, namely, the stacked sheets are sequentially fed out of the sheet supply tray 4. For preventing two or more sheets from being fed at once, a multifeed preventing roller 2 is provided to prevent advance of the second lowermost and subsequent sheets while the lowermost sheet is being fed. For this purpose, it is common that the multifeed preventing roller 2 is rotated in a direction opposite to a direction of advance of the paper sheets. In this instance, the second lowermost and subsequent sheets are dragged by the lowermost sheet due to friction force acting between the sheets, and are likely to buckle at their leading end portions due to the rotation of the multifeed preventing roller 2 in the opposite direction, thereby resulting in failure in the sheet feed. Therefore, conventionally, a guide plate 5 is

provided for reducing a contact angle (note: see attached sheet) at which the paper sheet is brought into contact with the multifeed preventing roller 2 (note: namely, for reducing a distance D, as shown in the attached sheet, from a line tangent to circumferential surfaces of the respective rollers 1, 2 to a contact point at which the paper sheet is brought into contact at its leading end with the circumferential surface of the multifeed preventing roller 2,) for thereby smoothly introducing the paper sheet into a nipping region defined between the rollers 1, 2.

[0003] However, if a distal end of the guide plate 5 is positioned in a position that is considerably close to the nipping region, the second lowermost and subsequent sheets following the lowermost sheet are likely to be forced by the guide plate 5 against the feed roller 1 and accordingly are given a feed force larger than necessary, whereby a multifeed trouble is likely to be caused. On the other hand, if the distal end of the guide plate 5 is positioned in a position that is considerably distant from the nipping region, the above-described contact angle is so large that the buckling of the leading end portion of the paper sheet can not be prevented.

[0004] In the conventional sheet supplying device as shown in Fig. 1 with combination of the feed roller 1 and multifeed preventing roller 2, it is extremely difficult to obtain a suitable configuration of the guide plate 5 and to establish a suitable position of the guide plate 5 relative to the rollers 1, 2. Such a difficulty impedes an improvement in performance of feeding the paper sheets.

[0005] The present invention is an improvement for eliminating the conventional technical drawbacks that are described above, and provides a sheet supplying device having a guide plate which is positioned in the proximity of a nipping region defined between a feed roller and a multifeed preventing roller and which is configured to prevent buckling of the leading end portion of the paper sheet without reduction in performance for prevention of multifeed.

[0006] That is, the present invention is, in a sheet supplying device including a feed roller and a multifeed preventing roller which have radial protrusions and recesses so as to utilize rigidity of a paper sheet, characterized in that there is provided a guide member that is configured to extend up to a nipping region defined between the rollers with the guide member being not in contact with either one of the rollers.

[0007] Figs. 3 and 4 show an embodiment of the invention.

[0008] As shown in Figs. 3 and 4, the feed roller 1 and the multifeed preventing roller 2 are not in direct contact with each other, and have radial protrusions and recesses (note: radial protrusions and recesses formed in outer circumferential surfaces of the rollers 1, 2). The radial protrusions of one of the rollers 1, 2 overlap with the radial recesses of the other of the rollers 1, 2 (note: namely, the radial protrusions of one of the rollers 1, 2 are positioned within the respective radial recesses of the other of the rollers 1, 2 so that a radially outer end portion of the feed roller 1 overlaps with a radially outer end portion of the multifeed preventing roller 2). Thus, the paper sheet is given a corrugated shape when being interposed between the rollers 1, 2, whereby the corrugated-shaped paper sheet is forced by its own rigidity against the roller 1, and the paper sheet can be fed owing to a friction generated between the paper sheet and the roller 1. Similarly, the subsequent paper sheet is also given a corrugated shape whereby a friction is generated between the subsequent paper sheet and the multifeed preventing roller 2. The friction generated between the subsequent paper sheet and the multifeed preventing roller 2 is kept larger than a friction acting between the paper sheets, whereby the multifeed problem can be avoid.

[0009] The guide plate 5, which is provided for preventing buckling of the leading end portion of the paper sheet by the multifeed preventing roller 2, has projections so as to have a comb-like shape as a whole, as shown in Fig. 5. The guide plate 5 is positioned relative to the rollers 1, 2 such that the projections of the guide plate 5 are aligned with the radial protrusions of the multifeed preventing roller 2 and such that the projections of the guide plate 5 extend up to the nipping region (overlapping region) defined between the rollers 1, 2. Fig. 4 is a cross sectional view taken in line IV-IV of Fig. 3. As shown in Fig. 4, since the projections of the guide plate 5 have respective distal end portions extend up to a part of the overlapping region, it is possible to cause the paper sheet to come into contact with the multifeed preventing roller 2 at a contact angle that is small enough to prevent buckling of the leading end portion of the paper sheet, and also to avoid a friction acting between the paper sheet and the feed roller 1 from being increased to a degree higher than necessary. Thus, a satisfactory sheet feeding performance can be obtained.

[0010] Figs. 7 and 8 show another embodiment of the present invention in which the guide plate 5 is positioned relative to the rollers 1, 2 such that the projections of the guide plate 5 are aligned with the radial protrusions of the feed roller 1 and such that the projections of the guide plate 5 extend up to the overlapping region defined between the rollers 1, 2.

[0011] Like in the above-described embodiment, in the present embodiment, the paper sheet comes into contact with the multifeed preventing roller 2 at a contact angle which can be reduced sufficiently by a suitable design of the configuration of the guide plate 5, for preventing buckling of the paper sheet. A sheet 6 interposed between the rollers 1, 2 is given a shape as shown in Fig. 9, and the feed motion of the sheet 6 is not impeded at all by the guide plate 5. In the present embodiment, even where the guide plate 5 is arranged to extend throughout an entirety of the nipping region, the performance of the multifeed preventing roller 2 is not reduced.

[0012] As is clear from the above descriptions, in the present invention, it is possible to prevent buckling of the leading end portion of the paper sheet, without reducing performance of the multifeed preventing roller 2. Further, the guide plate 5 is positioned in a position that can be more variable than in the conventional sheet supplying device of type in which the feed roller and the multifeed preventing roller do not overlap with each other.

[0013] Further, the embodiment shown in Figs. 7, 8 and 9 may be modified such that the distal end portion of the guide plate 5 is formed of an elastic member such as plate spring or Mylar and such that the distal end portion of the guide plate 5 is arranged to be in contact with the drive roller 1. In this modified arrangement, it is possible to increase a feed force applied from the feed roller 1 to the paper sheet and accordingly to permit the roller 1 to be formed with a material having a low friction coefficient.

4. Brief Description of Drawing

Fig. 1 is a side view of a conventional sheet supplying device. Fig. 2 is an enlarged view of a part of Fig. 1, for showing effect exhibited in the device. Figs. 3-9 are views showing embodiments of the invention. Fig. 3 is a front view. Fig. 4 is a cross sectional view taken along line IV-IV of Fig. 3. Fig. 5 is a perspective view of a guide plate. Fig. 6 is an enlarged

view showing a part of Fig. 3. Fig. 7 is a front view showing another embodiment. Fig. 8 is a cross sectional view taken along line VII-VII of Fig. 7. Fig. 9 is an enlarged view showing a part of Fig. 7.

Reference sign "1" denotes a feed roller, "2" denotes a multifeed preventing roller, and "3" denotes a guide plate.